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(54) Title: NEW GLASS MATERIAL AND METHOD OF PREPARING SAID GLASS

(57) Abstract: Abstract The invention relates to nitride glass with the general formula axbygz, wherein a is a glass modifier comprising at least one electropositive element, b comprises Si, B, Ge, Ga and/or Al, and g is N or N together with O, whereby the atomic ratio of O:N is in the interval from 65:35 to 0:100, a method for preparing a nitride glass and the use of the glass. The results clearly shows that the physical and mechanical properties of oxide glasses such as hardness, elastic modulus, fracture toughness, and glass transition temperature are improved/increased, when the atomic structure of the network is strengthened by replacing oxygen atoms bAbstract The invention relates to nitride glass with the general formula axbygz, wherein a is a glass modifier comprising at least one electropositive element, b comprises Si, B, Ge, Ga and/or Al, and g is N or N together with O, whereby the atomic ratio of O:N is in the interval from 65:35 to 0:100, a method for preparing a nitride glass and the use of the glass. The results clearly shows that the physical and mechanical properties of oxide glasses such as hardness, elastic modulus, fracture toughness, and glass transition temperature are improved/increased, when the atomic structure of the network is strengthened by replacing oxygen atoms by nitrogen atoms. Further, the results show that a very high refractivity index could be achieved.

AMENDED CLAIMS
[received by the International Bureau on 21 June 2004 (21.06.2004);
original claims 1-3 amended; remaining claims unchanged (2 pages)]

Claims

1. A nitride glass with the general formula $\alpha_x\beta_y\gamma_z$, wherein
α is at least one electropositive element chosen from the group of alkali metals Na, K and Rb, alkaline earth metals Be, Mg, Ca, Sr and Ba, transition metals Zr, Hf, Nb, Ta, W, Mo, Cr, Fe, Co, Ni, Zn, Sc, Y, and La, main group elements Pb, Bi, and f elements Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, Pa and U;
β is chosen from at least one of the elements of the group of Si, B, Ge, Ga and Al; and
γ is N or N together with O, whereby the atomic ratio of O:N is in the interval from 65:35 to 0:100.

2. A nitride glass according to claim 1, **characterised** in that α is chosen from the group of Lu, Mg, Y, Sc, Nd, Gd, Eu, Er, Tb, Tm, Dy, Yb, Th, Pa, Ca, Sr, Ba, La, Pr, Ce, Sm, Mn and Ho.

3. A nitride glass according to claims 1-2, **characterised** in that α is chosen from the group of Ca, Sr, Ba, La, Pr, Ce, Sm, Mn and Ho.

4. A nitride glass according to anyone of claims 1-3, **characterised** in that the ratio α:β is in the interval from 30:70 to 60:40, preferably in the interval from 41:59 to 60:40.

5. A nitride glass according to anyone of claims 1-4, **characterised** in that the ratio β:γ is in the interval from 33:67 to 22:78.

6. A nitride glass according to anyone of claims 1-5, **characterised** in that β comprises Si.

7. A nitride glass according to anyone of claims 1-6, **characterised** in that the hardness value for the glass is above 5 Gpa, preferably above 9.9 Gpa, and most preferably above 12.3 Gpa.

8. A nitride glass according to anyone of claims 1-7, **characterised** in that the refractivity index of the glass is above 1.4, preferably above 1.9, and most preferably above 2.2.

9. A nitride glass according to claim 1, **characterised** in that the glass possesses magnetic and/or magnetooptic properties and in that α contains at least one element chosen from the group of Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Pa U and Mn.

10. A method for preparing a nitride glass according to anyone of claims 1-9, comprising the steps of

a) mixing chemicals corresponding to the desired composition by using α as a pure metal and/or the corresponding metal nitrides or metal hydrides or any other compound that transforms to the corresponding nitride in nitrogen atmosphere during the synthesis;

b) heating said compounds to at least 1000 °C in the presence of nitrogen gas, thereby obtaining a melt;

c) maintaining the temperature of step b) until the mixed chemical compounds have formed a homogenous melt; and

d) cooling the melt to a temperature below the glass transition temperature and using a cooling rate, that is sufficient in order to obtain a glass phase.

11. A method according to claim 10, **characterised** in that the temperature in steps b) and c) is above 1500 °C, and preferably above 1800 °C.